

U.S. Application No.: 09/998,993  
Attorney Docket No. NOVLP074

### REMARKS

Claims 1-4, 6-13 and 15-25 are pending in this application. Claims 5 and 14 have been canceled. Claims 1 and 21 have been amended to incorporate the limitations of former claim 5 and claim 11 has been amended to incorporate the limitations of former claim 14. Claim 15 has been amended to reflect the amendment to claim 1.

All claims have been rejected as being anticipated by or obvious over Phatak et al. US Patent 6,852,649 ("Phatak"). Applicants have amended the claims to advance prosecution. Applicants reserve the right to remove the Phatak reference.

### Rejections under 35 USC § 102(e)

Claims 1-8, 10-18 and 20-25 have been rejected under 35 USC § 102(e) as being anticipated by Phatak.

Applicants have amended claim 1 to incorporate the limitations of former claim 5. As amended claim 1 recites determining the initial value of the dopant:silane ratio. Specifically, the claim recites performing two series of test depositions, each series performed at a different constant temperature, and then performing a third test deposition to measure a temperature profile. A dopant profile is obtained by the constant temperature test depositions (see, e.g., Fig. 7). The dopant profile information is used with the temperature profile information to estimate the amount of dopant precursor to use initially. (paragraph [0030]) As discussed, the etch profile is very sensitive to dopant concentration; using an initial ratio that is too low, for example, will result in an etch profile that is too narrow and hinders good contact between metal fill and the conduction layer (paragraph [0032]). The present invention provides a method to determine the initial value that will lead to the desired etch profile without having to perform trial and error etches (paragraph [0029]).

The Examiner states that Phatak fails to expressly teach the limits of former claim 5, but contends that Phatak disclose that the dopant concentration in the source gases achieve a constant dopant concentration in the layer, specifically pointing to Fig. 5. The Examiner further contends that "it is believed that the series of experiments to measure the time at which the temperature reaches a constant value and to set an initial value of the ratio...would necessarily be performed in Phatak to produce such data."

Applicants respectfully submit that, contrary to the Examiner's contention, Phatak does not implicitly or explicitly teach or suggest the steps of performing multiple series of constant-temperature test

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depositions and a test deposition to measure a temperature profile and then using this information to determine an initial value of the dopant:silane ratio.

Phatak discloses a method of depositing a doped insulating layer that involves varying the dopant:silane ratio over the deposition period. There is no teaching or suggestion of 1) creating a dopant profile from constant-temperature test depositions and 2) using the dopant profile information in connection with the temperature profile information to determine an initial ratio in Phatak. The only place where Phatak discusses an initial ratio is in reference to Fig. 6, stating "an increasing dopant gradient that would result from a constant ratio can be compensated for starting at a lower ratio." (col. 5, lines 49-51). There is no discussion of how the lower ratio is obtained. Nor is it necessary that the lower ratio be determined by the method Applicants claim; as discussed in Applicants' specification, determining this ratio may be accomplished by trial and error.

Fig. 5 of Phatak appears to be illustration of the various ways in which flow rates may be varied along with an illustration of temperature profile. There is no indication that these curves represent actual data rather than an illustration of step-wise versus linear variation in flow rate. Moreover, even if Fig. 5 did represent actual data, there is no teaching or suggestion of that the initial flow rates were determined by performing the test depositions that Applicants' claims require and not by, for example, trial and error.

Thus, Applicants' claimed methods are not explicitly or implicitly anticipated or suggested by Phatak.

For at least these reasons, Applicants submit that claim 1 is patentable over the cited art. In addition, independent claims 11, 21, 22 and 23 also recite the steps of performing two series of test depositions, each series performed at a different constant temperature, and performing a third test deposition to measure a temperature profile to determine either an initial value of the dopant:silane ratio (claims 11 and 23) or a set of values of the ratio to be used during deposition (claims 21 and 22). Applicants thus submit that these claims are patentable for at least the reasons given above with respect to claim 1. Dependent claims 2-4, 6-8, 10, 12, 13, 15-18, 20, 24 and 25 depend from one of the independent claims and are also patentable for at least these reasons.

Accordingly, Applicants request that the Examiner withdraw these 35 USC § 102(e) rejections.

### **Rejections under 35 USC § 103**

Claims 9 and 19 have been rejected under 35 USC § 103(a) as being obvious over Phatak. Because claim 9 and 19 depend from claims 1 and 11, respectively, Applicants submit that these claims are patentable for at least the reasons claim 1 and 11 are patentable.

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Conclusion

Claims 1-25 define novel and non-obvious subject matter of the present invention. Therefore, a notification that the application is in condition for allowance is earnestly solicited. Please telephone Applicants' attorney to ensure that there are no remaining concerns that would prevent the issuance of a Notice of Allowance.

Respectfully submitted,  
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